OCEAN CLASSROOM

The Study of Corals

What are corals?

EDUCATOR GUIDE

THE
UNIVERSITY
OF RHODE ISLAND
GRADUATE SCHOOL
OF OCEANOGRAPHY

Guiding Question "What is coral?"

Day 1

Time required: 45 minutes

Procedure:

Divide students into groups of 3 or 4.

Have them read: *Informational Essay:The Anatomy of a Coral Polyp* aloud within their groups. Students are to highlight the important facts.

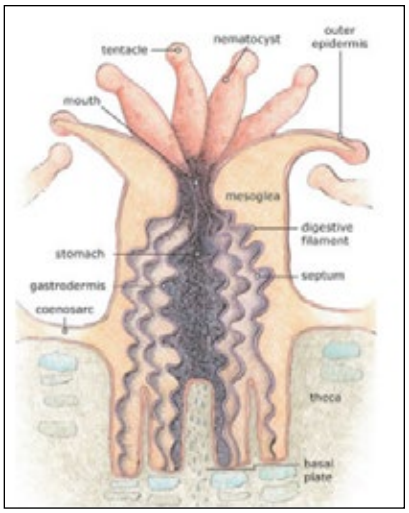
Then, the group must divide the number of words on the *Vocabulary Terms* sheet and look them up. Students write down and share the definitions until everyone has a completed sheet.

Students can use *The Anatomy of a Coral Polyp* diagram for help.

Answers: Vocabulary Terms

Basal Plate the very bottom of the polyp's protective cup or calyx

Calcium carbonate $CaCO^3$ is a chemical compound formed by three main elements: Carbon, Oxygen and Calcium. Coral polyps bring in seawater containing CO^2, into a space between its cells and the surface of their existing skeletons and produce $CaCO^3$, limestone, that makes up their hard skeletons.



Calyx The protective cup on which the coral polyp sits, it is made of calcium carbonate and is also called a callicle.

Coenosarc The living tissue overlying the stony skeletal material of the coral that connects polyps together, the coenosarc links the polyps and allows them to share nutrients and act as one organism.

Coral reef An underwater diverse ecosystem characterized by reef-building corals, reefs are formed of colonies of coral polyps held together by calcium carbonate.

Colony A community of organisms that live together, a coral "group" is a colony of genetically identical polyps.

Epidermis the outer layer of cells that covers the coral polyp

Filaments thin thread-like structures inside the stomach of a coral polyp

Invertebrates animals that do not have a backbone

Nematocysts specialized cells in the tentacles of a polyp containing venom or toxins that can be used in self-defense or to capture prey

Organism any living thing composed of a single cell or a complex of cells in which the parts work together to carry out the various processes of life

Polyp A tiny, soft-bodied organism, related to sea anemones and jellyfish, that may live individually or in a colony, coral polyps have a hard, limestone skeleton.

Tentacles slender, flexible limbs or appendages in animal, especially around the mouth of an invertebrate, used for grasping or defense

Theca hard walls that surround the protective cup of the coral

Day 2

Time required: 45 minutes

Procedure:

Have students sit in their groups.

Ask each group to tell the class one important fact that they highlighted from the essay.

Review *Vocabulary Terms* making sure students correct their answers.

Next, give the groups 20 to 30 minutes to watch the videos listed on Videos, Interactive Sites and Live Feed. Remind them that they have to watch the videos BEFORE playing the games. (You may prefer to show the videos to the whole class at once, then let them go back to their groups.)

Lastly, ask the students to complete *Anatomy of a Coral Polyp Diagram* and the *Word Search* sheet.

Day 3

Time required: 45 minutes

Procedure:

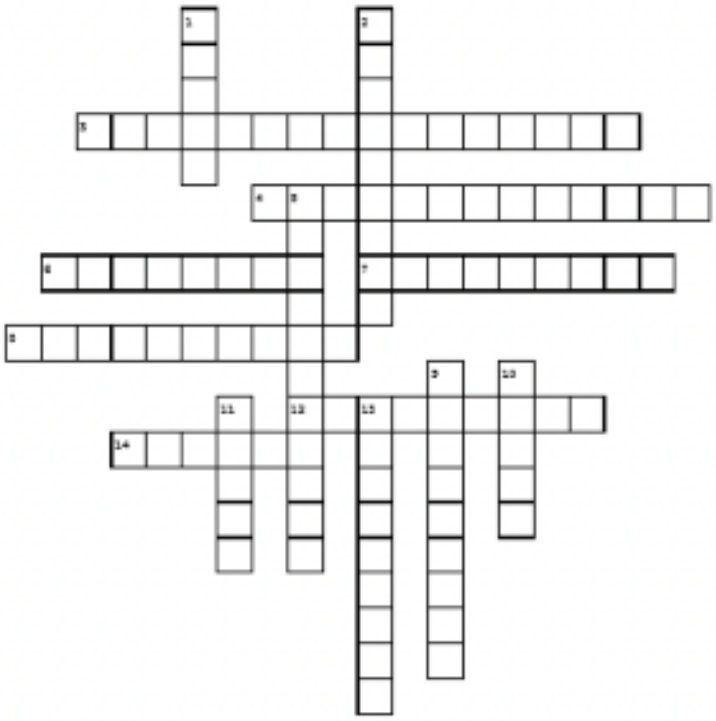
Review answers to the *Labeling Worksheet* with the class.

Ask the students how many words they circled on the Word Search. Have students return to their groups to complete the *Crossword Puzzle* together.

Correct the Crossword Puzzle.

Answers:

Anatomy of a Coral Polyp Crossword



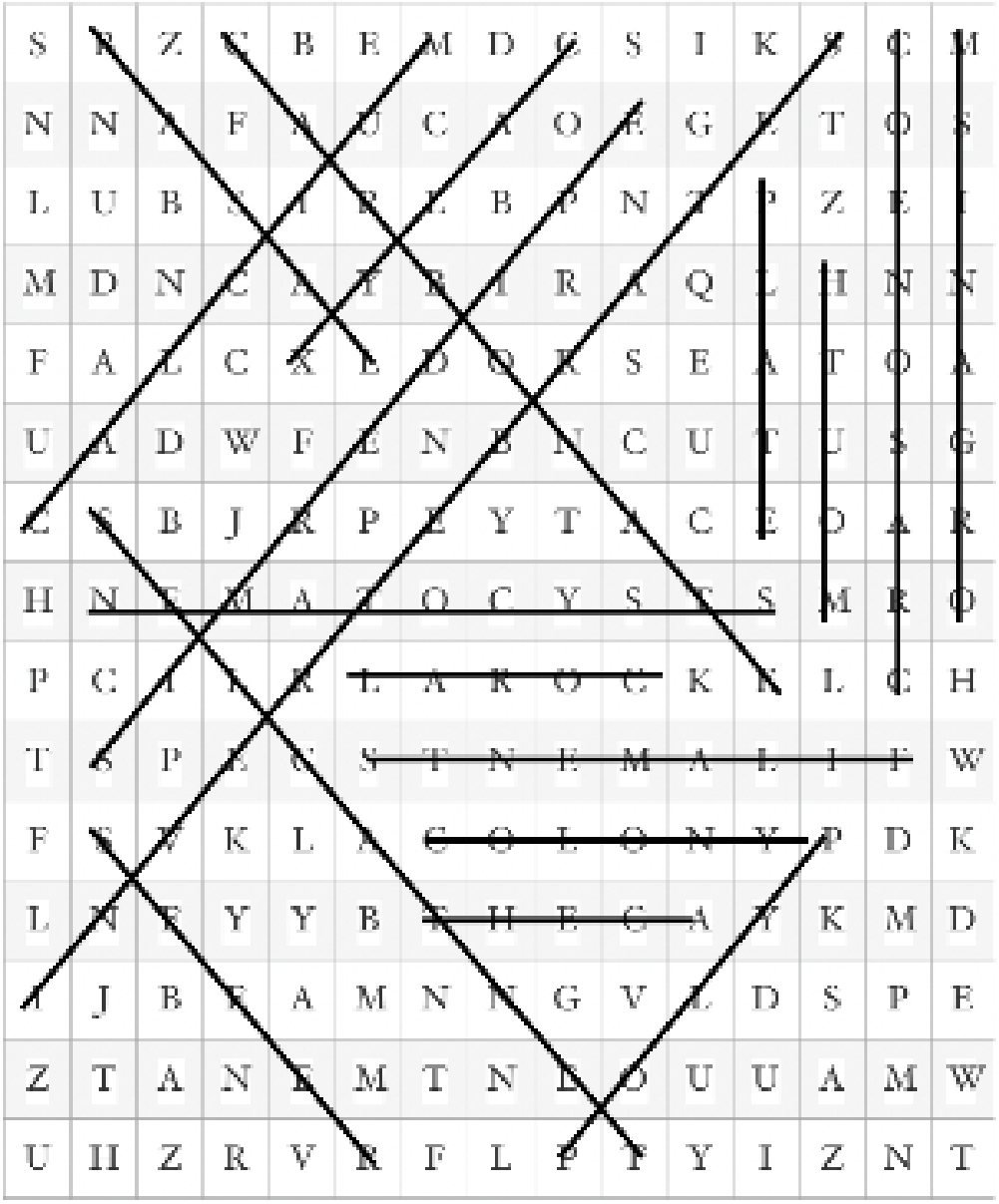
Down

1. Theca
2. Filaments
3. Nematocysts
4. Coral Reef
5. Calyx
6. Reefs
7. Epidermis

Across

1. Calcium Carbonate
2. Invertebrate
3. Organism
4. Tentacles
5. Basal Plate
6. Coensarc
7. Colony

Answers: Activity, Word Search



BASAL
CARBONATE
CORAL
INVERTEBRATES
ORGANISM
CALCIUM
COENOSARC
EPIDERMIS
MOUTH
PLATE
CALYX
COLONY
THECA
NEMATOCYSTS
REEFS
TENTACLES
FILAMENTS
POLYP

Day 4

Corals and Calcium Carbonate Chemistry Activity

Time required: 45 minutes

Procedure:

In their groups, ask students if they can tell you what calcium carbonate is and why a coral needs this.

Read aloud the information on the Corals and Calcium Carbonate Chemistry student sheet. Ask students to click on the sites listed so they can view 3-D models of coral and their skeletons of calcium carbonate!

Read aloud the next half of the essay. Ask students to list all the elements that coral reefs need to produce calcium carbonate (carbonate, calcium, bicarbonate, hydrogen). Ask if anyone can explain the process of respiration (an organism takes in carbon dioxide and gives out fresh oxygen).

Explain that the activity will try and obtain calcium carbonate/limestone (coral skeleton) and also try to get the CO^2/your breath out of it. *We are going to simulate respiration!*

Pass out the materials needed and help students perform the activity. Ask students to work within their groups to answer the questions on their sheet. Lastly, if time allows, go over the answers to the activity (see below).

Note

When working with younger children, you may consider using goggles. Explain to them that in this activity, we were able to put our breath (carbon dioxide) into a liquid and then we were able to take our breath out again!!

After completing the lab, students are asked the following questions:

Q Can you describe how lime water reacted when carbon dioxide was added?

A The lime water becomes milky and there was a white precipitate.

Q Why do you think this happened?

A When CO^2 is added to lime water, it becomes milky due to the production of calcium carbonate ($CaCO^3$). Calcium carbonate is insoluble and precipitates (settles out of solution): $Ca(OH)^2$ (aq) + CO^2 (g) → $CaCO^3$ (s) + H^2O (l)

Q Describe how the tap water reacted when carbon dioxide was added.

A The regular water bubbles as the CO^2 is added, but no precipitate forms.

Q Describe what happened to the precipitate (white substance) when you added vinegar.

A The white powder started to fizz

Q Why do you think this happened?

A The white powder was calcium carbonate, the substance that makes up coral skeletons, and it reacts with acid (such as vinegar). If it is $CaCO^3$, there should be a fizzing reaction from the release of carbon dioxide.

Resources

MacGillyvray Freeman's Coral Reef Adventure Film Guide
http://www.coralfilm.com/CRAEducatorGuide.pdf

Bermuda Biological Station for Research and the College of Exploration: Bermuda's Coral Reefs
https://www.coexploration.org/bbsr/coral/html/corals_of_bermudas_reefs.html

Southeast Florida Coral Reef Initiative: Lesson Plans
https://southeastfloridareefs.net/lesson-plans-k-12/

Flower Garden Banks National Marine Sanctuaries, NOAA: Coral Up Close Activity
https://nmsflowergarden.blob.core.windows.net/flowergarden-prod/media/archive/document_library/eddocs/coralupclose.pdf

Coral Basics
https://flowergarden.noaa.gov/education/coralbasics.html

Sanctuary Video Series
https://flowergarden.noaa.gov/vid/fgbvideoseries.html

Coral Spawning
https://flowergarden.noaa.gov/education/coralspawning.html

Spawning Videos
https://flowergarden.noaa.gov/vid/spawningvideos.html

Coral Cores: Ocean Timelines
https://nmsflowergarden.blob.core.windows.net/flowergarden-prod/media/archive/document_library/eddocs/coralcores.pdf

PBS LearningMedia: The Coral Reef Ecosystem
https://mass.pbslearningmedia.org/resource/hew06.sci.life.eco.lpecosystem/the-coral-reef-ecosystem/

TERC EarthLabs: Building a Reef
https://serc.carleton.edu/eslabs/corals/3a.html